

Rio Mesa Solar Electric Generating Facility (RMSEGF)
(11-AFC-4)
Applicant's Specific Comments on the Preliminary Staff Assessment

PROJECT ALTERNATIVES

SPECIFIC COMMENTS

1. **Page 6.1-18, Second Paragraph:** The PSA's review of the "No Project Alternative" should be substantially revised to reflect "what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services" (14 CCR 15126.6[e][2]). The CEQA guidelines state that "If disapproval of the project under consideration would result in predictable actions by others, such as the proposal of some other project, this 'no project' consequence should be discussed" (14 CCR 15126.6[e][3][B]). In particular, "[W]here failure to proceed with the project will not result in preservation of existing environmental conditions, the analysis should identify the practical result of the project's non-approval and not create and analyze a set of artificial assumptions that would be required to preserve the existing physical environment" (*Id*).

The PSA states that "It is unknown whether MWD would issue a new competitive request for proposal process for a new solar project. Based on the available information, the no project alternative consists of retaining Rio Mesa SEGF site in its current condition." Applicant disagrees with this assertion since the landowner issued a RFP for renewable energy development and attracted multiple bidders. Moreover, the state's renewable energy and greenhouse gas objectives would remain in effect in the no project alternative, and in-state generation of renewable electricity will continue to be an important and growing industry sector for California. A fundamental purpose of the RFP is for MWD to significantly increase their revenue attributable to the MWD owned land on the project site. Thus, to suggest that MWD would not continue to pursue revenue opportunities for the property is very unlikely. Consequently, it is reasonably foreseeable that MWD would reissue a competitive solicitation and the MWD property would continue to be developed for solar energy production.¹ The PSA should account for this scenario and revise its analysis of the No-Project Alternative accordingly.

Finally, the existing land use designations in Riverside County contemplate the development of the project site as a solar energy project. Ordinance No. 348.4734 allows for solar energy systems as an accessory use in all zones. Land Use Policy LU 15.15 provides that the County will permit and encourage the development of renewable energy resources and related infrastructure. Most notably, Ordinance 348.4705 authorizes solar power plants on the existing land use zones for the project site (W-2 and N-A). These land use policies should be considered in the No-Project alternative, and the PSA should not presume that the project site would remain in an undeveloped state.

2. **Page 6.1-21, Second Paragraph:** The PSA incorrectly estimates the linears for the Sonoran West off site alternatives to be shorter than the proposed project. While this is true for the gen-tie line, it is not true for the natural gas interconnection pipeline. Applicant requests that Staff revise the PSA as follows:

¹ Applicant makes no statements regarding what would be developed under the no project alternative. However, under all of the renewable energy scenarios that could be considered under the no project alternative, the proposed project would be the least impactful from an environmental perspective.

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The linear corridors for the transmission line for the Sonoran West Off-site Alternative would be shorter than those for the proposed project for the generator intertie line, but would be longer for the natural gas interconnection pipeline. The project applicant identified a possible alignment for a generation intertie line (gen-tie) to the proposed Colorado River Substation which is located adjacent to the Sonoran West Off-site Alternative. The natural gas pipeline to connect to the Southern California Gas Company pipeline for the Sonoran West Off-site Alternative would be less than one mile approximately two miles long from an existing interconnect point. The natural gas interconnect pipeline for the Rio Mesa SEGF is only 250 - 400 feet from the TransCanada Gas Transmissions North Baja Pipeline to the project fence-line. similar in length to the natural gas pipeline to connect the proposed Rio Mesa SEGF project to the TransCanada Gas Transmission Company North Baja pipeline.

3. **Page 6.1-22, Table 1:** The PSA incorrectly estimates the Air Quality Construction related emissions as slightly less than RMS. The emissions would be similar on site, less for the gen-tie, and more for the natural gas interconnect. Other issues with respect to differences between Sonoran West and RMS have been similarly updated. Applicant requests that Staff revise the PSA as follows:

**Alternatives Table 1
Summary Comparison of the Proposed Project's Impacts
to the Sonoran West Off-site Alternative**

	Proposed Project	Sonoran West Off-site Alternative	
Environmental Effect	Impact Significance	Impact Significance	Comparison to Proposed Project
Air Quality			
Construction-related emissions	SM	SM	<u>Similar</u> Slightly less
Project operations emissions	SM	SM	Similar
Greenhouse Gases	LS	LS	Similar
Biological Resources			
Impacts to vegetation and special status plants – sand dune habitat and transport	SM	SM	Greater
Impacts to vegetation and special status plants – all other species	SM	SM	Similar
Impacts to waters of the US	SM	LS	Much less
Impacts to waters of the state including microphyll woodland habitat	PSU <u>PSM</u>	PSU <u>PSM</u>	Similar
Impacts on desert tortoise	SM	SM	Slightly greater
Impacts on special-status terrestrial wildlife species (other than desert tortoise) – Mojave fringe-toed lizard	SM	SM	Greater
Impacts on special-status terrestrial wildlife species (other than desert tortoise) – all other species	SM	SM	Similar
Impacts on avian species, including raptors	SU <u>PSM</u>	SU <u>PSM</u>	Similar or slightly less
Cultural Resources			

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to the Sonoran West Off-site Alternative

	Proposed Project	Sonoran West Off-site Alternative	
Environmental Effect	Impact Significance	Impact Significance	Comparison to Proposed Project
Potential to disturb, destroy, or visually degrade significant prehistoric and historical archaeological sites or ethnographic resources, or impact built environments on or beyond the site	UNK at this time <u>PSM</u>	UNK at this time	UNK at this time
Geology and Paleontology			
Potential impacts from strong seismic shaking	SM	SM	Similar
Potential impacts from soil failure caused by hydro-collapse and/or dynamic compaction	SM	SM	Similar
Potential impacts on paleontological resources	SM <u>LS</u>	SM <u>LS</u>	Similar <u>Much less</u>
Hazardous Materials			
Risk of fire or explosion during commissioning or operations	SM	SM	Similar
Risk of hazardous material spill off-site during hazardous materials transportation	SM	SM	Similar
Risk of hazardous material spill off-site resulting from hazardous materials storage and use on-site	SM	SM	Similar
Risk of drawdown of emergency response services causing impact off-site	SM	SM	Similar
Land Use			
Compatibility with land use plan, policy, or regulation	LS	LS	Similar
Noise and Vibration			
Potential for noise to impact noise-sensitive receptors	SM	SM	Slightly less
Public Health			
Potential for project operations to cause air toxics-related impacts that could affect public health	LS	LS	Similar
Socioeconomic Resources			
Adversely impact acceptable levels of service for police protection (law enforcement), schools, parks, and recreation	SM <u>LS</u>	SM <u>LS</u>	Similar
Displace substantial numbers of people and/or existing housing	LS	LS	Similar
Induce substantial population growth in the area	SM	SM	Similar
Traffic and Transportation			
Damage to Roads and Bridges	SM	SM	Less
Glint Impacts to Motorists and Pilots – heliostats	SM	SM	Slightly greater
Level of Service on Roads and Highways – Construction	SM	SM	Slightly less
Level of Service on Roads and Highways – Operation	LS	LS	Similar

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Alternatives Table 1
Summary Comparison of the Proposed Project's Impacts
to the Sonoran West Off-site Alternative

	Proposed Project	Sonoran West Off-site Alternative	
Environmental Effect	Impact Significance	Impact Significance	Comparison to Proposed Project
Glare Impacts to Motorists and Pilots – solar receiver steam generator	LS	LS	Slightly greater
Transmission Line Safety and Nuisance			
Potential for impacts related to aviation safety, hazardous shocks, nuisance shocks, and electric and magnetic field exposure	SM	SM	Slightly less
Visual Resources			
Visual change/contrast of project facilities, excluding glare effect	SM <u>LS</u>	SM <u>LS</u>	Slightly greater
Potential to create a new source of glare from solar receivers	SM <u>LS</u>	SM <u>LS</u>	Slightly greater
Waste Management			
Material/waste generated during the construction and operation would be managed in an environmentally safe manner, i.e. recycling or disposal	SM	SM	Similar
Potential for disposal or diversion of project materials to cause impacts on existing waste disposal or diversion facilities	SM	SM	Similar
Potential for impacts on human health and the environment related to past or present soil or water contamination	SM	SM	Slightly greater
Soil and Surface Water			
Soil erosion by wind and water during project construction or operations	SM	SM	Similar
Potential contamination of groundwater resources from infiltration	SM	SM	Similar
Environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly	SM	SM	Similar
Water Supply			
Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level	LS	LS	Similar

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Alternatives Table 1
Summary Comparison of the Proposed Project's Impacts
to the Sonoran West Off-site Alternative

	Proposed Project	Sonoran West Off-site Alternative	
Environmental Effect	Impact Significance	Impact Significance	Comparison to Proposed Project

Notes: — = no impact
 UNK = significance of impact is unknown
 B = beneficial impact
 LS = less-than-significant impact, no mitigation required
 SM or PSM = significant or potentially significant impact that can be mitigated to less than significant
 SU or PSU = significant and unavoidable or potentially significant and unavoidable impact that cannot be mitigated to less than significant

4. **Page 6.1-39, Sixth Paragraph; Page 6.1-51, Second Paragraph, Page 6.1-63, Second Paragraph:** CEQA requires a lead agency to determine whether an alternative would satisfy most of the project objectives. The PSA concludes that development of the 410-MW solar power tower project with energy storage alternative, 250 MW reduced acreage alternative, and the “several hundred” MW PV alternative “*would partially*” meet the objective of constructing and operating a 500 MW solar generating facility. Partially meeting a project objective is a misleading review standard.

The Applicant’s original objective is to build a 750 MW solar generating facility using the BrightSource proprietary solar power tower technology. This objective was reduced to a 500 MW solar generating facility using Applicant’s proprietary technology through the Applicant’s Environmental Enhancement Proposal. Further reduction in the output of the project will not “partially” meet the Project objective, rather they *won’t* meet the Project objective. The PSA should be revised to state that the various alternatives with substantially less capacity than the preferred alternative would *not* meet the project objective of constructing a 500 MW solar generating facility. Moreover, as noted above, the PSA’s analysis should be revised to reflect that Applicant’s objective is to utilize the BrightSource proprietary solar power tower technology.

5. **Page 6.1-41, First Paragraph:** The PSA fails to acknowledge Southern California Edison’s role in the PPA amendment process. Applicant suggests revising the PSA as follows:

The applicant states that it has targeted the last quarter of 2015 for commercial operation of the proposed project. For the Hidden Hills Solar Electric Generating System (Hidden Hills SEGS) Staff Assessment, the Energy Commission staff contacted the CPUC to inquire about the overall process involving CPUC’s approval of PPAs for renewable energy projects. CPUC staff stated that filing of amended advice letters requesting amendments to PPAs is not an uncommon occurrence during the development process for renewable energy projects (Energy Commission 2012az). Once a PPA is approved, submittal of an amended advice letter to CPUC requesting an amended PPA is required unless the change to the project was accounted for in the original PPA for the project (e.g., a PPA that allows a project location or technology change). CPUC’s review of requests for amended PPAs considers resultant changes to the pricing structure of the PPA, project viability, and value compared to cost. For example, in considering a hypothetical amendment to a PPA to add energy storage to a solar thermal project, and assuming SCE would agree to amend the PPAs in a way that allows the project to continue to be feasible, CPUC would assess the net economic benefit of the added

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storage. Given the complexity of permitting and construction for these large solar power projects, staff believes it is likely that BrightSource Energy's strategic planning processes acknowledge the potential for project changes to affect project scheduling and financing and the potential need to amend a PPA.

6. **Page 6.1-44, Second Full Paragraph:** The PSA states that the SPT with Energy Storage Alternative would not require overnight boilers or auxiliary boilers. The current design of BrightSource Energy's energy storage system continues to make use of auxiliary firing of natural gas. Please revise the paragraph as indicated:

Under the SPT with Energy Storage Alternative at the Rio Mesa site Staff may view the Solar Reserve RSEP as a possible Thermal Energy Storage ("TES") technology, however the RSEP technology is proprietary to Solar Reserve and not available to the Applicant. In addition, this technology has not yet been deployed at commercial scale and is not compatible with the BrightSource technology. Applicant acknowledges that the RSEP may be able to operate without auxiliary gas firing, except power plant commissioning would require small boilers for the initial melting, heating, and conditioning of the salt thermal storage medium. The salt melting process during commissioning of the project would result in higher emissions than the initial commissioning phase of the proposed project. The RSEP technology requires no other natural gas use for plant operations.

BrightSource is developing its own TES solution that is designed to work with its existing Direct Steam SPT configuration. The BrightSource developed SPT with Energy Storage Alternative would not continue to use auxiliary boilers. the Night Preservation and Auxiliary Boilers. An additional Gas fired "Independent Superheater" will be added to each unit to provide superheat to the steam produced by the molten salt TES system. This design focuses on improvements to the Plant's capacity and dispatchability (MW-hrs per year), while maintaining roughly the same levels of air emissions as the proposed non-storage project. would reduce project operations emissions during regular plant operations.

Net air quality emissions impacts would be less than Rio Mesa SEGF for this alternative technology. No auxiliary boilers would be required for project operations of this alternative because the molten salt would provide this service, and much less fuel would be used during the commissioning phase to liquefy the salt compared to the fuel use that would be required to operate the auxiliary boilers for the proposed project over its life. The salt melting process during commissioning of the project may result in higher emissions than the initial commissioning phase of the proposed project. During operations the emissions would be less than that of Rio Mesa SEGF.

7. **Page 6.1-51, Fourth Full Paragraph:** The PSA asserts that a 250 MW solar power tower project with or without energy storage "is feasible in a slightly longer timeframe than that of the proposed site." The timeframe needed to redesign the project site *and* incorporate storage technology would require *much more* than a "slightly longer timeframe". This sentence should be revised to remove the word "slightly".
8. **Page 6.1-54, First Paragraph:** The PSA's assertion that construction emissions, including fugitive dust and exhaust from equipment and worker vehicles would be reduced by half is incorrect. The proposed project includes many shared facilities such as the gen tie line, the construction laydown area, switchyard, gas metering yard, and common areas. These shared facilities will still be required regardless of whether one unit or two units are installed. Emissions for building one unit would be greater than half, but the electrical output would be half of the proposed

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project. Based on a lb of emissions/MW comparison, the construction emissions from this Alternate are greater than those of the proposed project. Therefore, the air quality impact from construction of the Reduced Acreage SPT with or without Energy Storage Alternative would **be slightly less than Rio Mesa SEGF.**

9. **Page 6.1-55, First Paragraph:** The PSA minimizes the effect a reduced project would have on GHG emissions. This alternative would reduce the contribution to the RPS goals by half and would continue reliance on new and existing fossil-fired electricity. The proposed project would displace twice as much fossil fired generation as the 250 MW alternative. The Applicant requests changing the significance impact for GHG from **slightly greater to greater than Rio Mesa SEGF.**
10. **Page 6.1-55, Last Paragraph:** The PSA asserts the operational impacts to bird and bat species would be reduced by one third to one half. Impacts due to potential collisions are not proportional to total project acreage. The biological impact on avian species, including raptors of the Reduced Acreage SPT with or without Energy Storage Alternative would **be much less than Rio Mesa SEGF.**
11. **Pages 6.1-60 through -63, Solar Photovoltaic (PV) Overview Subsection:** The PSA neglects to discuss and analyze the massive grading requirements for solar PV projects identified in the PSA. The PSA states on page 6.1-74, first full paragraph, 5th sentence “Installation of the supports for PV panels would likely require significant site grading.” Alternatives Table 4 provides summary descriptions of seven approved utility-scale solar PV projects in California; *all* of which, with defined technology will require near 100% levels of grading, including laser-level grading. Impacts from large-scale grading are completely ignored in the alternatives analysis and would be substantially greater than the Applicant’s proposed development methodology for the heliostat field. The extensive grading required by typical PV projects would significantly increase impacts to many resource areas, specifically air quality, biological resources, cultural resources, paleontological resources, and soil and surface water resources (please see attached Figure *Alternatives 1*). The PSA should be revised to consider the significant impacts that would result from the large-scale grading required by a solar PV alternative, which are avoided under the proposed project.

In addition, the PSA focuses on an acre/MW comparison of PV and the proposed project. Applicant believes that to fully evaluate the difference in land requirements between PV and the proposed project, the PSA should primarily consider the capacity factors for PV and the proposed project. The PSA includes an estimate that a PV facility would utilize 7.4 acres per megawatt, whereas the BrightSource LPT technology uses 7.0 acres per megawatt. Under these assumptions, utilization of PV at Rio Mesa would result in a 5.5% reduction in megawatt plant capacity. In addition, the capacity factor at Rio Mesa is 32.7%. By comparison, the nearest PV resource (i.e., one with a comparable solar resource) has a capacity factor 20.8%.² Consequently, the actual annual output of the proposed project would be 1.4 gwh/year, or 40% greater than the Desert Sunlight Solar Farm project, which has a 550MW nameplate capacity and would utilize the same footprint at the Project site. Put another way, to produce the same quantity of power to the grid using single-axis or fixed-tilt PV would require 4,950 acres of land, or **51% more** land than using Applicant’s technology. The environmental analysis of the PV Alternative should be updated to reflect the additional land needed to produce the same quantity of energy, rather than simply evaluate the land required for a plant of a similar nameplate capacity.

² This estimated capacity factor is based on Table 4 at P. 6.1-62 of the PSA, Row 2 (Desert Sunlight Solar Farm Project, which is in close proximity to the proposed project).

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12. **Page 6.1-64, Fifth Paragraph:** The PSA should not quote the proposed decision of the CPUC. While the Applicant agrees that the PPA is an integral consideration in evaluating the feasibility of a particular alternative, it is not appropriate for the Commission or Staff to opine on the value or reasonableness of the PPA. Determinations of whether costs of PPAs are reasonable are within the purview of the CPUC and there is no reason that CPUC's discussion from a proposed decision should be referenced in this document.³ For these reasons, Applicant requests that Staff revise the PSA as follows:

If the project technology at the Rio Mesa SEGF site were changed to a PV technology, an amended advice letter would have to be filed with CPUC requesting amendments to the PPAs. The work required to redesign the project to use PV technology would delay the project schedule. It is not known whether CPUC would approve amendments to the PPAs allowing the technology change. It is also not known at what point a project schedule delay would affect project viability. For example, the PPA includes forecasted initial operation dates of ~~September 2015 and December 2015~~. As noted in Applicant's response to Data Request 170 and 171, even a few months delay could jeopardize project viability. ~~The CPUC is currently considering the Rio Mesa PPA. The Draft Resolution would deny cost recovery for the Rio Mesa 1 and Rio Mesa 2 PPAs because they compare poorly on price and value relative to other solar thermal projects offered to SCE (CPUC 2012a). An alternate Draft Resolution has been proposed that would deny cost recovery for Rio Mesa 1 PPA and approve cost recovery for the Rio Mesa 2 PPA (CPUC 2012b). The Resolutions are on the Public Agenda for the Commission Meeting scheduled for October 11, 2012.~~

13. **Page 6.1-65 through 6.1-67, Alternatives Table 5:** The Applicant has proposed revisions to conclusions and analysis presented within the PSA for several resource area analyses for the proposed Project, which should be incorporated in the Table 5 as noted below.

³ With respect to the Project's PPA's and the PD referenced in the PSA, it is important to note that the Decision is now final, approves the PPAs and thus the language in this paragraph is no longer germane to the discussion of the PPA.

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Alternatives Table 5
Summary Comparison of the Proposed Project's Impacts
to the Solar PV Alternative⁴

Environmental Effect	Proposed Project	Solar PV Alternative	
	Impact Significance	Impact Significance	Comparison to Proposed Project
Air Quality			
Construction-related emissions	SM	SM	Similar <u>Much Greater</u>
Project operations emissions	SM	SM	Less
Greenhouse Gas	LS	LS	Slightly Less <u>Greater</u> (due to less displacement of fossil resources)
Biological Resources			
Impacts to vegetation and special status plants	SM	SM <u>PSU</u>	Similar <u>Much Greater</u>
Impacts to waters of the US	SM	SM <u>PSU</u>	Similar <u>Much Greater</u>
Impacts to waters of the state including microphyll woodland habitat	PSU <u>PSM</u>	PSU	Similar <u>Much Greater</u>
Impacts on desert tortoise	SM	SM	Similar
Impacts on special-status terrestrial wildlife species (other than desert tortoise)	SM	SM	Similar <u>Slightly Greater</u>
Impacts on avian species, including raptors	SU <u>PSM</u>	SM	Much Greater <u>Similar</u>
Cultural Resources			
Potential to disturb, destroy, or visually degrade significant prehistoric and historical archaeological sites or ethnographic resources, or impact built environments on or beyond the site	UNK at this time <u>PSM</u>	UNK at this time <u>PSU</u>	UNK at this time <u>Much Greater (due to the need for extensive grading)</u>
Geology and Paleontology			
Potential impacts from strong seismic shaking	SM	SM	Less <u>Similar</u> (either alternative <i>must</i> be constructed to code)
Potential impacts from soil failure caused by hydro-collapse and/or dynamic compaction	SM	SM	Less <u>Similar</u>
Potential impacts on paleontological resources	SU <u>LS</u>	SU	<u>Much Greater</u> Less (due to extensive grading)
Hazardous Materials			
Risk of fire or explosion during commissioning or operations	SM	SM	Less
Risk of hazardous material spill off-site during	SM	SM	Similar

⁴ Applicant requests that this table be substantially revised due to the need for massive grading required for the PV Alternative.

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Alternatives Table 5
Summary Comparison of the Proposed Project's Impacts
to the Solar PV Alternative⁴

	Proposed Project	Solar PV Alternative	
Environmental Effect	Impact Significance	Impact Significance	Comparison to Proposed Project
hazardous materials transportation			
Risk of hazardous material spill off-site resulting from hazardous materials storage and use on-site	SM	SM	Similar
Risk of drawdown of emergency response services causing impact off-site	SM	SM	Similar
Land Use			
Compatibility with land use plan, policy, or regulation	LS	LS	Similar
Noise and Vibration			
Potential for noise to impact noise-sensitive receptors	SM	SM	Less
Public Health			
Potential for project operations to cause air toxics-related impacts that could affect public health	LS	LS	Less Similar
Socioeconomic Resources			
Adversely impact acceptable levels of service for police protection (law enforcement), schools, parks, and recreation	SM LS	SM LS	Similar
Displace substantial numbers of people and/or existing housing	LS	LS	Similar
Induce substantial population growth in the area	SM	SM	Similar
Traffic and Transportation			
Damage to Roads and Bridges	SM	SM	Slightly less
Glint Impacts to Motorists and Pilots – heliostats	SM	SM	Much less (offsite project glint and glare from heliostats is limited to less than defined MPE at the legal flight encroachment)
Level of Service on Roads and Highways – Construction	SM	SM	Much Slightly less
Level of Service on Roads and Highways – Operation	LS	LS	Similar
Glare Impacts to Motorists and Pilots – solar receiver steam generator	LS	LS	Much Less
Transmission Line Safety and Nuisance			
Potential for impacts related to aviation safety, hazardous shocks, nuisance shocks, and electric and magnetic field exposure	SM	SM	Similar
Visual Resources			

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Alternatives Table 5
Summary Comparison of the Proposed Project's Impacts
to the Solar PV Alternative⁴

Environmental Effect	Proposed Project	Solar PV Alternative	
	Impact Significance	Impact Significance	Comparison to Proposed Project
Visual change/contrast of project facilities, excluding glare effect	LS SU	LS SU	NA Less
Potential to create a new source of glare from solar receivers	LS ⁵ SU	LS	NA Much less
Waste Management			
Material/waste generated during the construction and operation would be managed in an environmentally safe manner, i.e. recycling or disposal	SM	SM	Similar
Potential for disposal or diversion of project materials to cause impacts on existing waste disposal or diversion facilities	SM	SM	Similar
Potential for impacts on human health and the environment related to past or present soil or water contamination	SM	SM	Similar or slightly greater
Soil and Surface Water			
Soil erosion by wind and water during project construction or operations	SM	SM	Much Greater
Potential contamination of groundwater resources from infiltration	SM	SM	Similar
Environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly	SM	SM	Less Greater (Substantial stormwater diversion is required for the PV Alternative)
Water Supply			
Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level	LS	LS	NA Less

Notes: — = no impact
 UNK = significance of impact is unknown
 B = beneficial impact
 LS = less-than-significant impact, no mitigation required
 SM or PSM = significant or potentially significant impact that can be mitigated to less than significant
 SU or PSU = significant and unavoidable or potentially significant and unavoidable impact that cannot be mitigated to less than significant

⁵ Applicant acknowledges that glare from the towers will be noticeable but the PSA provides does not provide evidence indicating that the impact of the glare will be potentially significant.

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14. **Page 6.1-67, First Paragraph, Third Sentence:** As described in the General Comments for Alternatives, the PSA does not address the greater levels of fugitive dust emissions that would result during construction of a solar PV alternative. The PV facilities cited in the PSA would require massive grading of the project site (AV Solar Ranch One Project, for example). Applicant suggests revising as follows:

Construction-related emissions and impacts would be **much greater than Rio Mesa SEGF** for this alternative.

15. **Page 6.1-68, First Full Paragraph:** The PSA does no, but should, consider the greater impacts to biological resources resulting from the extensive grading required by solar PV projects. Applicant suggests revising the PSA as follows:

Solar PV technology employs either fixed-tilt or tracking solar panels to collect incident radiation. Depending on the design of the solar collectors, a solar PV project will require extensive grading of the site. ~~Each of these two options would have similar potential impacts to biological resources, and this discussion applies to both types of PV solar collectors.~~ Assuming a project footprint with similar boundaries as the proposed Rio Mesa SEGF project, impacts to all terrestrial special-status species and habitats, including waters of the state and waters of the U.S., would be **similar to much greater than the proposed Rio Mesa SEGF**. A generic PV project would require substantial additional grading and leveling of the site compared with the Rio Mesa SEGF. ~~However, the proposed project~~ The substantial loss of vegetation and substrate in graded areas would result in a **similar much greater loss of habitat** throughout the entire project footprint compared with the Rio Mesa SEGF.

16. **Page 6.1-68, Third Full Paragraph:** Applicant strongly disagrees that collision risk to birds and bats would be less from PV panels than from heliostats. Most PV panels are a deep blue color, are installed contiguously on a project site, and the panels are placed in a very dense arrangement with little space between the panels. The proposed project's heliostats would cover approximately 10 - 15% of the total project site, which allows a much greater space between the heliostats. The proposed Project will present a much more fragmented image. By comparison, PV panels would cover approximately 40% of the project site.⁶ As a result, a PV project would produce an appearance similar to a body of water. (See Figure *Alternatives 2*). Since many avian species are attracted to large bodies of water, the PV alternative would pose a greater risk of collision than the Applicant's proposed project. Applicant suggests revising the PSA as follows:

Operational impacts to birds ~~and perhaps bats from collision with heliostats or~~ flying through the zones of concentrated solar energy above the heliostat fields would be **much less for the Solar PV Alternative than for the proposed Rio Mesa SEGF**. PV technology does not employ mirrors (heliostats) focused on central collector towers. PV technology would not create a zone of concentrated solar energy above the project area and there would be no singeing or burning impacts to birds. Birds would be at risk of collision with the solar PV panels, ~~although and staff believes has no evidence that the collision risk would be less than any different to the risk of collisions with heliostats for the proposed project due to the low reflectivity of PV panels.~~ Habitat loss for birds and bats would be dependent on the project footprint, but ~~be~~ would likely be similar to habitat loss for other species (above) and **similar to greater than the proposed Rio**

⁶ This estimate is based on information received from Thomas Starrs, Managing Director, SunPower, Nov. 2012.

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Mesa SEGF since a comparable sized PV facility (from an annual energy production basis) would require 51% more land than the proposed project.

17. **Page 6.1-69, Second Full Paragraph:** The PSA states that the Solar PV Alternative would not require the deep or otherwise specialized foundations that would be required for the collector towers and the numerous heliostat foundations of the proposed project. This is inaccurate for several reasons. The pylons for the Rio Mesa solar fields will not be installed in any kind of foundation, but rather will be inserted into the ground via vibration. Moreover, many PV technologies require foundations to support solar PV arrays (such as those recommended for several of the Projects in Alternatives Table 4). Finally, the number of pylons that will be installed in each solar field of the Project may roughly equate to the number of posts required to install a solar PV panel array, or depending on the technology installed, may even be less than a PV Project,. For these reasons, the PSA should consider impacts to paleontological resources from the proposed Project to be similar to the Solar PV Alternative. Finally, since a PV alternative would require extensive grading, impacts to paleontological resources would be significantly greater under the PV alternative. Applicant suggests revising as follows:

Construction and operation of the Solar PV Alternative at the proposed project site could have less similar impacts compared to the proposed Rio Mesa SEGF. ~~While t~~The Solar PV Alternative would not require the deep or otherwise specialized foundations required for the Rio Mesa SEGF, all of that excavation at Rio Mesa will be monitored by a paleontological monitor. In addition, impacts to paleontological resources from insertion of the heliostat pylons, is estimated to impact only 0.2% of the underlying paleosol resource. This minute amount of unrecoverable impact to paleontological resources is less than significant. ~~that would be required for the collector towers and the numerous heliostat foundations of the proposed project.~~ The Solar PV would ~~eliminate~~on most of the deep foundations and would decrease the potential for encountering fossil bearing strata and, due to elimination of tall tower structures, the project as a whole would have a decrease in seismic susceptibility. However, the massive grading required for the installation of the solar PV panel systems and transformers would require monitoring by a paleontological monitor as mitigation to assure that discovered resources are properly accounted. Therefore, while the site excavation activities are quite different between the Rio Mesa SEGF and theThe Solar PV Alternative, both alternatives would not worsen current conditions, and would not result in impacts that are similar and not cumulatively significant under CEQA significant. ~~Potential impacts on geological and paleontological resources under this alternative would be less than the Rio Mesa SEGF.~~

18. **Pages 6.1-74, First Full Paragraph:** The PSA assumes that the PV panels would require cleaning at a lesser frequency than the Project's heliostats without providing any supporting evidence. Additionally, Staff assumes that because more area will be graded and additional dirt roads created for ease of access to maintain the PV panels, less fugitive dust will be emitted during operation. Finally, Staff concludes that impacts related to soil erosion during project operations would be less than the proposed Project. These assumptions and conclusions are made without supporting evidence and are seemingly counterintuitive in nature. Applicant asserts that the large-scale grading that would accompany many Solar PV technologies (as stated in the 5th sentence of this paragraph) would result in far greater impacts from soil erosion than the limited ground disturbance proposed for the Rio Mesa SEGF.

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19. **Page 6.1-77 through 6.1-79, Alternatives Table 6:** The Applicant has proposed revisions to several resource area analyses which should be incorporated in the Table 6 as noted below.

Alternatives Table 6
Summary Comparison of the Proposed Project's Impacts
to the Parabolic Trough Alternative

	Proposed Project	Parabolic Trough Alternative	
Environmental Effect	Impact Significance	Impact Significance	Comparison to Proposed Project
Air Quality			
Construction-related emissions	SM	SM	Similar — <u>Much Greater (due to extensive grading)</u>
Project operations emissions	SM	SM	Slightly greater
Greenhouse Gases	LS	LS	Similar
Biological Resources			
Impacts to vegetation and special status plants	SM	SM	Much <u>Slightly</u> greater
Impacts to waters of the US	SM	SM <u>PSU</u>	Much <u>Slightly</u> greater
Impacts to waters of the state including microphyll woodland habitat	PSU <u>PSM</u>	PSU <u>PSM</u>	Much Greater — <u>Similar</u>
Impacts on desert tortoise	SM	SM	Slightly greater
Impacts on special-status terrestrial wildlife species (other than desert tortoise)	SM	SM	Slightly greater
Impacts on avian species, including raptors	SU <u>PSM</u>	SM	Much less — <u>Similar</u>
Cultural Resources			
Potential to disturb, destroy, or visually degrade significant prehistoric and historical archaeological sites or ethnographic resources, or impact built environments on or beyond the site	UNK at this time <u>PSM</u>	UNK at this time <u>PSU</u>	UNK at this time <u>Much Greater (due to the need for extensive grading)</u>
Geology and Paleontology			
Potential impacts from strong seismic shaking	SM	SM	<u>Greater</u> Less —(Due to miles of HTF Piping)
Potential impacts from soil failure caused by hydro-collapse and/or dynamic compaction	SM	SM	<u>Similar</u> Less
Potential impacts on paleontological resources	SU <u>LS</u>	SU <u>PSM</u>	<u>Similar to Greater than</u>
Hazardous Materials			
Risk of fire or explosion during commissioning or operations	SM	SM	Much <u>Slightly</u> greater (Due do miles of HTF Piping)
Risk of hazardous material spill off-site during hazardous materials transportation	SM	SM	Slightly greater
Risk of hazardous material spill off-site resulting from hazardous materials storage and use on-site	SM	SM	<u>Similar</u> — <u>Slightly Greater</u>
Risk of drawdown of emergency response services causing impact off-site	SM	SM	Slightly greater

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**Alternatives Table 6
Summary Comparison of the Proposed Project's Impacts
to the Parabolic Trough Alternative**

Environmental Effect	Proposed Project Impact Significance	Parabolic Trough Alternative Impact Significance	Comparison to Proposed Project
Land Use			
Compatibility with land use plan, policy, or regulation	LS	LS	Similar
Noise and Vibration			
Potential for noise to impact noise-sensitive receptors	SM	SM	Similar
Public Health			
Potential for project operations to cause air toxics-related impacts that could affect public health	LS	LS	Similar
Socioeconomic Resources			
Adversely impact acceptable levels of service for police protection (law enforcement), schools, parks, and recreation	SM LS	SM LS	Similar
Displace substantial numbers of people and/or existing housing	LS	LS	Similar
Induce substantial population growth in the area	SM	SM	Similar
Traffic and Transportation			
Damage to Roads and Bridges	SM	SM	Slightly less Similar
Glint Impacts to Motorists and Pilots – heliostats	SM	SM	Much less Similar
Level of Service on Roads and Highways – Construction	SM	SM	Much less Similar
Level of Service on Roads and Highways – Operation	LS	LS	Slightly greater
Glare Impacts to Motorists and Pilots – solar receiver steam generator	LS	LS	Much less
Transmission Line Safety and Nuisance			
Potential for impacts related to aviation safety, hazardous shocks, nuisance shocks, and electric and magnetic field exposure	SM	SM	Similar
Visual Resources			
Visual change/contrast of project facilities, excluding glare effect	SU LS	SU LS	Less
Potential to create a new source of glare from solar receivers	SU LS	LS	Much less
Waste Management			
Material/waste generated during the construction and operation would be managed in an environmentally safe manner, i.e. recycling or disposal	SM	SM	Similar Slightly Greater
Potential for disposal or diversion of project materials to cause impacts on existing waste disposal or diversion facilities	SM	SM	Similar Slightly Greater
Potential for impacts on human health and the environment related to past or present soil or water contamination	SM	SM	Similar Much Greater (due to extensive grading and miles of HTF Piping)

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**Alternatives Table 6
Summary Comparison of the Proposed Project's Impacts
to the Parabolic Trough Alternative**

Environmental Effect	Proposed Project	Parabolic Trough Alternative	
	Impact Significance	Impact Significance	Comparison to Proposed Project
Soil and Surface Water			
Soil erosion by wind and water during project construction or operations	SM	SM	Greater <u>Much Greater</u> (due to extensive grading)
Potential contamination of groundwater resources from infiltration	SM	SM	Similar <u>Greater</u> (due to potential HTF leaks)
Environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly	SM	SM	Similar <u>Greater</u> (due to massive storm water diversion)
Water Supply			
Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level	LS	LS	Similar

Notes: — = no impact
 UNK = significance of impact is unknown
 B = beneficial impact
 LS = less-than-significant impact, no mitigation required
 SM or PSM = significant or potentially significant impact that can be mitigated to less than significant
 SU or PSU = significant and unavoidable or potentially significant and unavoidable impact that cannot be mitigated to less than significant

20. **Page 6.1-80, First Sentence:** The PSA does not address the greater levels of fugitive dust emissions that would result from grading during construction of a solar trough alternative. Applicant suggests revising the PSA as follows:

Construction-related emissions and impacts would be greater than the ~~similar to~~ Rio Mesa SEGF for this alternative.

21. **Page 6.1-80, First Full Paragraph:** The PSA does not consider the greater impacts to biological resources resulting from the extensive grading required by solar trough projects. Applicant suggests revising as follows:

Assuming a project footprint with similar boundaries as the proposed Rio Mesa SEGF project, impacts from the Parabolic Trough Alternative to all terrestrial special-status species and habitats, including waters of the state and waters of the U.S., would be similar to much greater than the proposed project. A generic solar parabolic trough project would require substantial additional grading and leveling of the site compared with the Rio Mesa SEGF. ~~However, the proposed project~~ The extensive loss of vegetation and substrate in graded areas would result in a ~~similar~~ much greater loss of habitat throughout the entire project footprint compared with the Rio Mesa SEGF.

22. **Page 6.1-80, Third Full Paragraph:** The PSA asserts that risk of collision from the Solar Parabolic Trough Alternative would be much less than for the proposed project due the shape and reduced accessibility of the mirror surfaces to birds (due to the presence of the HTF tube in front of the mirrors and the concavity of the mirrors themselves). Applicant disagrees. Further,

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the PSA for the Carrizo Energy Solar Farm states that the 56-foot tall receiver structures would require guy wires for stabilization, resulting in a network of guy wires throughout the solar field, which would pose a collision threat to avian and bat species which would not exist at the proposed Project. The receivers may also attract avian species as a potential perching location. In addition, the PSA provides no evidence for the assertion that birds have similar sensitivities to light as humans. This statement is unfounded and should be deleted from the PSA. Applicant suggests revising the PSA as follows:

Parabolic trough technology can cause significant glint and glare impacts to wildlife, including golden eagles and other raptors, and other special status species. The glint and glare impacts of solar trough technology can cause light intensity unsafe for humans at a distance of approximately 60 feet from the solar field perimeter fencing (Energy Commission 2010c). ~~Assuming that birds' tolerance to light intensity is similar to human tolerance, this impact to birds could be significant.~~ In addition, birds would be at risk of colliding with parabolic mirrors, and the guy wires and the receivers. The receivers for the parabolic trough technology can also attract avian species as a potential perching location., ~~though staff believes that risk of collision would be much less than for the proposed project due to shape and reduced accessibility of the mirror surfaces to birds (due to the presence of the HTF tube in front of the mirrors and the concavity of the mirrors themselves).~~ Finally, ~~the risk to birds of burning or other damage from concentrated solar energy would be much less than for the proposed project.~~ In sum, the risk of Parabolic Trough Alternative to birds including golden eagle, other raptors, and other special-status species would be much less similar for the Parabolic Trough Alternative than for the proposed Rio Mesa SEGF. Habitat loss for birds and bats would be dependent on project footprint, but would be would be similar to habitat loss for other species (above) and similar to much greater than the proposed Rio Mesa SEGF.

23. **Page 6.1-87-88: Solar PV Alternative:** The Engineering Assessment for the PV Alternative measures the efficiency of PV panels by evaluating the solar irradiance that will be measured on a PV panel. Based on the estimated irradiance, the PSA provides estimates of expected efficiency rates per square meter for fixed tilt and dual axis PV systems. The Applicant is concerned that this analysis is incomplete and potentially misleading. Irradiance does not allow for an accurate comparison of PV as an alternative to SPT from an engineering perspective because the amount of solar radiance on a PV panel is not a primary predictor of generic PV (or SPT) performance. PV performance is a function of multiple factors, including solar-to-electric conversion efficiency of the panels at different illumination levels and environmental conditions, DC-to-AC conversion efficiency of the inverters, and overall balance-of-plant efficiency (solar field distribution losses, transformers, etc.). In addition, high temperature performance degradation and long-term performance degradation, affect the ultimate reliability of PV systems. Thus, simply calculating the amount of irradiance does not allow for an accurate comparison of the efficiency of PV panels to the SPT technology. Accordingly, the Applicant suggests revising the PSA to remove the analysis of irradiation and instead provide a quantitative comparison of the operational attributes of Solar PV and the proposed project as indicated in the text edits shown below:

A dual-axis PV tracker faces the sun, while an SPT heliostat faces halfway between the sun and the receiver. PV uses global radiation to convert sunlight to energy. PV converts light energy to direct-current electricity at low voltage, while SPT converts light energy to thermal energy in steam which is used to generate high-voltage AC electricity like any

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other thermal generator on the grid. Consequently, the respective conversion efficiency of PV is not comparable to the SPT technology.

In addition, Solar PV has a lower on-peak availability factor than the SPT technology. According to the CPUC's "RPS Calculator", PV systems have on peak availability factors between 51-65%, whereas solar thermal systems have on-peak availability factors of 71-87%. In other words, the proposed project would operate more during peak conditions or the "coincident peak".

Finally, there are a range of other attributes provided by solar thermal that are known to be desirable from an operational perspective, and cannot be provided by PV. The proposed project would utilize synchronous generators, providing similar reliability and operational benefits to the system as conventional power plants at no additional costs. When the SPT plants are on-line, these benefits include reactive power support, dynamic voltage support, voltage control, some degree of inertia response, primary frequency control, frequency and voltage ride-through, small signal stability damping, and the ability to mitigate Sub-Synchronous Resonance ("SSR"). In addition, according to the California Independent System Operator (CAISO), "the system capacity will be lowered if Solar Thermal projects in the Eastern Bulk System are not dispatched". Thus, the technology of the proposed project would provide attributes that bring system benefits, which solar PV cannot provide.

PV cells convert solar radiation directly into electrical current. Photons of light excite electrons to a higher energy state, providing the potential to induce current. Direct current (DC) from the PV cells pass through an inverter, which converts DC to alternating current suitable for transmission to the electrical power grid.

Using average annual daily radiation as a benchmark, **Alternatives Table 7** shows the effectiveness of different types of solar collectors for the alternative renewable technologies evaluated in this staff assessment. The table lists the total daily values for the weather station nearest the project site, represented by monthly and average annual conditions and sorted by collector type. Data are shown for a double-axis flat-plate collector typical of a power tower heliostat; the daily insolation value is 9.4 kWh/m²-day (Category 1.3). From **Alternatives Table 7**, the incident radiation for a flat-plate fixed tilt PV panel is 6.6 kWh/m²-day (Category 1.1) and 9.1 for a single-axis flat-plate collector typical of a tracking PV system (Category 1.2). Using comparative ratios, the flat-plate double-axis collectors associated with the SPT project perform 42 percent better than the fixed-tilt PV panels $[(9.4 - 6.6)/6.6 = 0.42]$. The performance factor between the single-axis tracking PV panels and the representative SPT heliostats is 3 percent $[(9.4 - 9.1)/9.1 = 0.03]$. To conclude, the SPT project heliostats function 42 percent better than the fixed-tilt PV panels, but the performance differential between the SPT heliostats and the single-axis tracking PV panels is insignificant⁷.

⁷ Since 3 percent is less than the plus or minus 9 percent uncertainty in the historical measurements, the collection effectiveness of the Rio Mesa SEGf heliostats and a project using single-axis tracking flat plate PV collectors is similar.

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Alternatives Table 7
Average Daily Solar Radiation at Daggett, California
(kilowatt-hours per square meter [kWh/m²])

Tilt	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Category 1.1: Flat Plate Collectors with Fixed Tilt PV Modules													
34.9°	5.3	6.0	6.8	7.4	7.4	7.4	7.2	7.3	7.3	6.8	5.2	6.6	6.6
Category 1.2: Flat Plate Collectors with Single Axis Tracking, North-South Axis, Tracking PV Modules													
34.9°	6.5	7.5	9.0	10.3	10.9	11.2	10.7	10.6	10.1	8.8	7.2	6.3	9.1
Category 1.3: Flat Plate Collectors with Double Axis Tracking, SPT Heliostats													
34.9°	6.9	7.7	9.0	10.4	11.3	12.0	11.4	10.8	10.1	9.0	7.5	6.8	9.4
Category 1.4: Single Axis Direct Beam Concentrating Collectors, Parabolic Trough													
34.9°	5.1	5.8	6.9	8.0	8.4	8.9	8.4	8.4	8.2	7.2	5.7	5.0	7.2

Source: Weather Bureau Army Navy (WBAN), excerpts from WBAN No. 23161 for Daggett, California, which is the closest measuring station to the proposed Rio Mesa SEG site

24. Page 6.1-90, Last Paragraph: The PSA concludes that, excluding the no project alternative, the environmentally superior alternative appears to be the Solar Photovoltaic Alternative. As discussed above in General Comment 4, the PV Alternative should be dismissed from detailed analysis because it is potentially infeasible due to the fact that the Commission and the Applicant are unable to pursue this alternative. Even if staff considers the PV Alternative in detail, the PV alternative should still be rejected because it is not an economically viable alternative and would not reduce significant impacts posed by the preferred alternative.

As discussed above in the Applicant's specific comments, the PSA's conclusion that the PV alternative is the environmentally preferred alternative is based on an incomplete analysis. The PSA does not fully consider the extensive grading required for the PV technologies presented in the PSA. The PSA's analysis of the risk to avian species is also unsupported. Based on the Summary comparison table presented in Alternatives Appendix-2, which has been updated within these comments to reflect the Applicants response to the PSA, the environmentally superior Alternative (excluding the no project alternative) would be the reduced acreage alternative. However, as shown above, the reduced environmental impact of the reduced acreage alternative should be dismissed as infeasible because it is not economically viable at this particular site. Moreover, the environmental benefits of a reduced acreage alternative do not outweigh the loss of 250MW of stable renewable energy generation, as well as the greater number of jobs associated with a two unit project. For these reasons, the Commission should conclude that the preferred alternative is the proposed project.

Accordingly, the PSA should be revised as follows:

Based on the alternatives analysis, the environmentally superior alternative is the no project alternative. Among the action alternatives ~~(excluding the no project alternative)~~, the reduced acreage alternative is the environmentally superior alternative. However, the reduced acreage site would not be feasible because it is not considered economically viable at this project site. Since the reduced acreage alternative is not

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feasible, the proposed project is the preferred alternative. ~~the Solar Photovoltaic Alternative is preferred for biological resources and visual resources. For paleontological resources, the Sonoran West Off-Site Alternative would be preferred. At this time, the Sonoran West Off-Site Alternative appears to be preferred to the proposed site for cultural resources; however, additional analysis will be completed for publication in the FSA that may provide additional information regarding the cultural resources comparison between the two sites. Given the information available at this time, the environmentally superior alternative appears to be the Solar Photovoltaic Alternative.~~

25. **Alternatives Appendix-2:** Please modify this appendix to incorporate the suggested changes in this response.

Alternatives Appendix-2
Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative

Environmental Effect	Proposed RMSEGS Project	No-Project Alternative	Sonoran West Off-site Alternative	Solar Power Tower with Energy Storage Alternative	Reduced Solar Power Tower Alternative with or without Energy Storage	Solar Photo-voltaic Alternative	Parabolic Trough Alternative
Air Quality							
Construction-related emissions	SM	—	Slightly less than <u>Similar to</u> Rio MESA SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Less than Rio Mesa SEGF (SM)	Similar to <u>Much Greater than</u> Rio Mesa SEGF (SM)	<u>Much Greater than</u> Similar to Rio Mesa SEGF (SM)
Project operations emissions	SM	—	Similar to Rio Mesa SEGF (SM)	UNK Less than Rio Mesa SEGF (SM)	Less than Rio Mesa SEGF (SM)	Less than Rio Mesa SEGF (SM)	Slightly greater than Rio Mesa SEGF (SM)
Greenhouse Gases	LS	—	Similar to Rio Mesa SEGF (LS)	UNK Less than Rio Mesa SEGF (LM)	Slightly <u>Much</u> greater than Rio Mesa SEGF (LS)	<u>Greater</u> Slightly less than Rio Mesa SEGF (LS)	Similar to Rio Mesa SEGF (LS)
Biological Resources							
Impacts to vegetation and associated wildlife	SM	Much less than RMSEGS (LS)	Similar to Rio Mesa SEGF, greater than Rio Mesa SEGF for sand dune habitat (SM)	Similar to Rio Mesa SEGF (SM)	Much less than Rio Mesa SEGF (SM)	Similar to <u>Much greater than</u> Rio Mesa SEGF (SM)	<u>Much Slightly</u> greater than Rio Mesa SEGF (SM)

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Alternatives Appendix-2 Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative

Environmental Effect	Proposed RMSEGS Project	No-Project Alternative	Sonoran West Off-site Alternative	Solar Power Tower with Energy Storage Alternative	Reduced Solar Power Tower Alternative with or without Energy Storage	Solar Photo-voltaic Alternative	Parabolic Trough Alternative
Impacts on waters of the U.S.	SM	Much less than RMSEGS (LS)	Much less than Rio Mesa SEGF (LS)	Similar to Rio Mesa SEGF (SM)	Much less than Rio Mesa SEGF (SM)	Similar to <u>Much greater than</u> Rio Mesa SEGF (SM)	Slightly <u>much</u> greater than Rio Mesa SEGF (SM)
Impacts to Waters of the State including desert microphyll vegetation and associated wildlife habitat	<u>PSU-PSM</u>	Much less than RMSEGS (LS)	Similar to Rio Mesa (<u>PSU-PSM</u>)	Similar to Rio Mesa (<u>PSU-PSM</u>)	Much less than Rio Mesa (Expected SM)	Similar to <u>Much greater than</u> Rio Mesa SEGF (SM)	<u>Much greater than</u> Similar to Rio Mesa (UNK)
Impacts on desert tortoise	SM	Much less than RMSEGS (LS)	Slightly greater than Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Much less than Rio Mesa SEGF (SM)	Similar to <u>Much Greater than</u> Rio Mesa SEGF (SM)	Slightly greater than Rio Mesa SEGF (SM)
Impacts on special-status terrestrial wildlife species (other than desert tortoise)	SM	Much less than RMSEGS (LS)	Greater than Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Much less than Rio Mesa SEGF (SM)	Similar to <u>Much Slightly greater than</u> Rio Mesa SEGF (SM)	Slightly greater than Rio Mesa SEGF (SM)
Impacts on avian species, including raptors	<u>SUPSM</u>	Much less than RMSEGS (LS)	Similar to or slightly less than Rio Mesa SEGF (<u>SUPSM</u>)	Similar to Rio Mesa SEGF (<u>SUPSM</u>)	Less than Rio Mesa SEGF (<u>SUPSM</u>)	Much less than <u>Similar to</u> Rio Mesa SEGF (SM)	Much less than <u>Similar to</u> Rio Mesa SEGF (SM)
Cultural Resources							

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Alternatives Appendix-2

Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative

Environmental Effect	Proposed RMSEGS Project	No-Project Alternative	Sonoran West Off-site Alternative	Solar Power Tower with Energy Storage Alternative	Reduced Solar Power Tower Alternative with or without Energy Storage	Solar Photo-voltaic Alternative	Parabolic Trough Alternative
Potential to disturb, destroy, or visually degrade significant prehistoric and historical archaeological sites or ethnographic resources, or impact built environments on or beyond the site	PSM <u>UNK</u> at this time	UNK at this time	UNK at this time	Similar to Rio Mesa SEGF (PSM) <u>UNK</u> at this time	Slightly less to Rio Mesa SEGF (PSM) <u>UNK</u> at this time	<u>Much greater</u> (due to the need for extensive grading) <u>UNK</u> at this time	<u>Much greater</u> (due to the need for extensive grading) <u>UNK</u> at this time
Geology and Paleontology							
Potential impacts from strong seismic shaking	SM	Much less than RMSEGS (LS)	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (LS <u>SM</u>)	Less than to Rio Mesa SEGF (PSM)	<u>Similar to Less than</u> Rio Mesa SEGF (SM)	<u>Greater Less than</u> Rio Mesa SEGF (PSM)
Potential impacts from soil failure caused by hydro-collapse and/or dynamic compaction	SM	Much less than RMSEGS (LS)	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (LS <u>SM</u>)	Less than Rio Mesa SEGF (PSM)	<u>Similar to Less than</u> Rio Mesa SEGF (SM)	<u>Similar to Less than</u> Rio Mesa SEGF (PSM)
Potential impacts on paleontological resources	SM <u>LS</u>	Much less than RMSEGS (LS)	Much less than <u>Similar to</u> Rio Mesa SEGF (SM <u>LS</u>)	Similar to Rio Mesa SEGF (SM <u>LS</u>)	Less than Rio Mesa SEGF (SM <u>LS</u>)	<u>Much Greater Less than</u> Rio Mesa SEGF (PSM)	<u>Much Greater than Similar to</u> Rio Mesa SEGF (PSM)
Hazardous Materials							
Risk of fire or explosion during commissioning or operations	SM	—	Similar to Rio Mesa SEGF (SM)	<u>Slightly Greater</u> <u>Similar to</u> Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Less than Rio Mesa SEGF (LS)	<u>Much Slightly greater</u> than Rio Mesa SEGF (SM)

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Alternatives Appendix-2 Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative

Environmental Effect	Proposed RMSEGS Project	No-Project Alternative	Sonoran West Off-site Alternative	Solar Power Tower with Energy Storage Alternative	Reduced Solar Power Tower Alternative with or without Energy Storage	Solar Photo-voltaic Alternative	Parabolic Trough Alternative
Risk of hazardous material spill off-site during hazardous materials transportation	SM	—	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Slightly greater than Rio Mesa SEGF (SM)
Risk of hazardous material spill off-site resulting from hazardous materials storage and use on-site	SM	—	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	<u>Slightly greater than</u> Similar to Rio Mesa SEGF (SM)
Risk of drawdown of emergency response services causing impact off-site	SM	—	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Slightly greater than Rio Mesa SEGF (SM)
Land Use							
Compatibility with land use plan, policy, or regulation	LS	—	Similar to Rio Mesa SEGF (LS)	Similar to Rio Mesa SEGF (LS)	Similar to Rio Mesa SEGF (LS)	Similar to Rio Mesa SEGF (LS)	Similar to Rio Mesa SEGF (LS)
Noise and Vibration							
Potential for noise to impact noise-sensitive receptors	SM	—	<u>Slightly less than</u> Similar to Rio Mesa SEGF (SM) (SM)	<u>Slightly Greater</u> than Rio Mesa SEGF (SM)	Slightly less than Rio Mesa SEGF (SM)	Less than Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)
Public Health							
Potential for project operations to cause air toxics-related impacts that	LS	—	Similar to Rio Mesa SEGF (LS)	Similar to Rio Mesa SEGF (LS)	Less than Rio Mesa SEGF (LS)	<u>Similar to</u> Less than Rio Mesa SEGF (LS)	Similar to Rio Mesa SEGF (LS)

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Alternatives Appendix-2
Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative

Environmental Effect	Proposed RMSEGS Project	No-Project Alternative	Sonoran West Off-site Alternative	Solar Power Tower with Energy Storage Alternative	Reduced Solar Power Tower Alternative with or without Energy Storage	Solar Photo-voltaic Alternative	Parabolic Trough Alternative
could affect public health							
Socioeconomic Resources							
Adversely impact acceptable levels of service for police protection (law enforcement), schools, parks, and recreation	<u>SMLS</u>	—	Similar to Rio Mesa SEGF (<u>SMLS</u>)	Similar to Rio Mesa SEGF (<u>SMLS</u>)	Slightly less than Rio Mesa SEGF (<u>SMLS</u>)	Similar to Rio Mesa SEGF (<u>SMLS</u>)	Similar to Rio Mesa SEGF (<u>SMLS</u>)
Displace substantial numbers of people and/or existing housing	LS	—	Similar to Rio Mesa SEGF (LS)	Similar to Rio Mesa SEGF (LS)	Similar to Rio Mesa SEGF (LS)	Similar to Rio Mesa SEGF (LS)	Similar to Rio Mesa SEGF (LS)
Induce substantial population growth in the area	SM	—	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)
Traffic and Transportation							
Damage to Roads and Bridges	<u>SM</u> PSM	—	Less than Rio Mesa SEGF (PSM)	Similar to or slightly greater than Rio Mesa SEGF (<u>PSM</u>)	Less than Rio Mesa SEGF (SM)	Slightly less than Rio Mesa SEGF (SM)	Similar to Slightly less than Rio Mesa SEGF (SM)
Glint Impacts to Motorists and Pilots – heliostats	<u>SM</u> PSM	—	Slightly greater than Rio Mesa SEGF (PSM)	Similar to Rio Mesa SEGF (<u>PSM</u>)	Similar to Rio Mesa SEGF (<u>PSM</u>)	Much less less than Rio Mesa SEGF (SM)	Similar to Much less less than Rio Mesa SEGF (SM)

PROJECT ALTERNATIVES

Alternatives Appendix-2
Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative

Environmental Effect	Proposed RMSEGS Project	No-Project Alternative	Sonoran West Off-site Alternative	Solar Power Tower with Energy Storage Alternative	Reduced Solar Power Tower Alternative with or without Energy Storage	Solar Photo-voltaic Alternative	Parabolic Trough Alternative
Level of Service on Roads and Highways – Construction	SM <u>LS</u>	—	Slightly less than Rio Mesa SEGF (SM)	Similar to or slightly greater than Rio Mesa SEGF (SM)	Less than Rio Mesa SEGF (SM)	Much <u>Slightly</u> less than Rio Mesa SEGF (SM)	Similar to <u>Much less</u> than Rio Mesa SEGF (SM)
Level of Service on Roads and Highways – Operation	LS	—	Similar to Rio Mesa SEGF (LS)	Similar to or slightly greater than Rio Mesa SEGF (LS)	Less than Rio Mesa SEGF (LS)	Similar to Rio Mesa SEGF (LS)	Slightly greater <u>More</u> than Rio Mesa SEGF (LS)
Glare Impacts to Motorists and Pilots – solar receiver steam generator	LS	—	Slightly greater than Rio Mesa SEGF (LS)	Similar to Rio Mesa SEGF (LS)	Similar to Rio Mesa SEGF (LS)	Much less than Rio Mesa SEGF (LS)	Much less than Rio Mesa SEGF (LS)
Transmission Line Safety and Nuisance							
Potential for impacts related to aviation safety, hazardous shocks, nuisance shocks, and electric and magnetic field exposure	SM	—	Slightly less than Rio Mesa SEGF (SM)	Similar to RMSEGS (SM)	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)
Visual Resources							
Visual change/contrast of project facilities, excluding glare effect	SU <u>LS</u>	Much less than Rio Mesa SEGF (LS)	Slightly greater than Rio Mesa SEGF (LS)	Similar to RMSEGS (SU <u>LS</u>)	Similar to Rio Mesa SEGF (LS)	NA <u>Less</u> than Rio Mesa SEGF (LS)	Less than Rio Mesa SEGF (LS)
Potential to create a new source of glare from solar	SU <u>LS</u>	Much less than Rio Mesa SEGF (LS)	Slightly greater than Rio Mesa SEGF	Similar to RMSEGS (SU <u>LS</u>)	Similar to Rio Mesa SEGF (SU <u>LS</u>)	NA <u>Much less</u> than Rio Mesa SEGF (SU)	Much less than Rio Mesa SEGF (SU)

PROJECT ALTERNATIVES

Alternatives Appendix-2

Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative

Environmental Effect	Proposed RMSEGS Project	No-Project Alternative	Sonoran West Off-site Alternative	Solar Power Tower with Energy Storage Alternative	Reduced Solar Power Tower Alternative with or without Energy Storage	Solar Photo-voltaic Alternative	Parabolic Trough Alternative
receivers			(SULS)				
Waste Management							
Material/waste generated during the construction and operation would be managed in an environmentally safe manner, i.e. recycling or disposal	SM	—	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	<u>Slightly greater</u> than Similar to Rio Mesa SEGF (SM)
Potential for disposal or diversion of project materials to cause impacts on existing waste disposal or diversion facilities	SM	—	Similar to Rio Mesa SEGF (PSM)	Similar to Rio Mesa SEGF (SM)	Less than Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (PSM)	<u>Slightly greater</u> than Similar to Rio Mesa SEGF (PSM)
Potential for impacts on human health and the environment related to past or present soil or water contamination	SM	—	Slightly greater than Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Similar to or slightly greater than Rio Mesa SEGF (SM)	<u>Much greater</u> than Similar to Rio Mesa SEGF (SM)
Soil and Surface Water							
Soil erosion by wind and water during project construction or	SM	Much less than Rio Mesa SEGF (LS)	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Less than Rio Mesa SEGF (SM)	<u>Much Greater</u> than Rio Mesa SEGF (SM)	<u>Much Greater</u> than Rio Mesa SEGF (SM)

PROJECT ALTERNATIVES

Alternatives Appendix-2 Summary Comparison of the Proposed Project's Impacts to the Project Alternatives and the No-Project Alternative

Environmental Effect	Proposed RMSEGS Project	No-Project Alternative	Sonoran West Off-site Alternative	Solar Power Tower with Energy Storage Alternative	Reduced Solar Power Tower Alternative with or without Energy Storage	Solar Photo-voltaic Alternative	Parabolic Trough Alternative
operations							
Potential contamination of groundwater resources from infiltration	SM	Much less than Rio Mesa SEGF (LS)	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Less than Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	<u>Greater than Similar to Rio Mesa SEGF (SM)</u>
Environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly	SM	Much less than Rio Mesa SEGF (LS)	Similar to Rio Mesa SEGF (SM)	Similar to Rio Mesa SEGF (SM)	Less than Rio Mesa SEGF (SM)	<u>Greater Less than Rio Mesa SEGF (SM)</u>	<u>Greater than Similar to Rio Mesa SEGF (SM)</u>
Water Supply							
Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level	LS	—	<u>UNK</u> Similar to Rio Mesa SEGF (SM) <u>LS</u>	<u>Slightly Greater</u> than Rio Mesa SEGF (SM)	Less than Rio Mesa SEGF (SM)	<u>NA Less than Rio Mesa SEGF (SM)</u>	Similar to Rio Mesa SEGF (SM)

Notes: — = no impact
UNK = significance of impact is unknown
B = beneficial impact
LS = less-than-significant impact, no mitigation required
SM or PSM = significant or potentially significant impact that can be mitigated to less than significant
SU or PSU = significant and unavoidable or potentially significant and unavoidable impact that cannot be mitigated to less than significant